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PACKAGE FREIGHT TRAFFIC ON THE MISSISSIPPI WATERWAY SYSTEM

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by

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In considering the merits of river and harbor improvements, there has been a tendency to use, as a measure of the efficiency of our waterways, the tonnage of freight handled regardless of its value. The growing importance and high value per ton of the package freight traffic is a factor which must not be ignored in considering the economic value of that commerce.

The total bulk freight on the rivers, canals, and connecting channels in 1929 amounted to 264,869,602 tons, valued at $2,142,749,397 of which 243,475,608 tons were of a miscellaneous character and 21,393,994 tons consisted of rafted and floated timber. The average value of the miscellaneous bulk freight was $8,38 per ton and that of the rafted and floated timber $4.73 per ton.

The package freight amounted to 17,692,036 tons, valued at $2,267,542,764 having an average value of about $128 per ton.*

While the package freight constituted only 6.26 per cent of the total freight handled on rivers, canals, and connecting channels in the United States during 1929, its value exceeded that of the bulk

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* Annual Report of the Chief of Engineers, U.S.Army.

COMMERCE ON RIVERS, CANALS, AND CONNECTING CHANNELS OF THE UNITED STATES

	Total bulk freight		Package freight		Total	
	Tons	Value	Tons	Value	Tons	Value
1922	131,940,852	$1,338,243,924	12,444,012	$1,831,095,840	144,384,864	$3,169,339,764
1923	188,518,211	1,689,369,182	11,370,621	1,845,221,502	199,888,832	3,534,590,684
1924	179,157,567	1,725,712,737	15,564,350	2,021,086,694	194,721,917	3,746,799,431
1925	210,830,229	1,870,886,068	16,873,893	2,366,664,095	227,704,122	4,237,550,163
1926	224,938,136	2,290,576,931	18,692,791	1,764,109,927	243,630,927	4,054,686,858
1927	239,654,561	2,285,679,628	13,992,353	2,097,879,232	253,646,914	4,383,558,860
1928	248,199,213	2,301,147,368	14,723,712	2,103,003,745	262,922,925	4,404,151,113
1929	264,869,602	2,142,749,397	17,692,036	2,267,542,764	282,561,638	4,410,292,161

Sources: Annual reports of the Chief of Engineers, U. S. Army.

freight which constituted 93.73 per cent of the total freight traffic on these waterways.

The economic significance of both the package and bulk freight traffic on our inland waterways is stated in a report issued by the Inland Waterway Corporation as follows:

"Many waterway advocates continually stress the fact that water facilities are adapted to low-grade, heavy commodities, and that such commodities alone should be handled, leaving to the railroads only the high-grade, high-class freight. This is an economic fallacy both ways. It would deprive the railroads of an immense quantity of bulk cargo now carried by them legitimately, cheaply, and profitably. It is true that even if the available streams carried all the bulk cargo available to them, their activities would still be restricted to the banks of the streams, and a very high percentage of the bulk freight would have to move into the interior by rail. Further, there would be a considerable portion of the states which could be served by rail more expeditiously and as economically as by any other method. On the other hand, if the benefits of our interior streams are to be restricted to the shippers of bulk cargo, how are we going to extend to all the people of the United States the inherent cheapness of water transportation? What is going to happen to the shipper of carload or

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less-than-carload freight who desires to utilize our rivers, if he sees all the facilities engaged in transporting cement, brick, salt, etc.? If there is to be supplementation, and cooperation of rail, water, and motor carriers, it is not going to be arrived at by taking the "filler" cargo from one and giving it to another, or the high-revenue cargo from one and giving it to the other. The law of supply and demand can not be changed by fiat, and the shipper must have his choice of water, rail, or motor for reasons which govern him, or he is not getting a square deal".*

Although cargo carried by water is often classified as either bulk cargo or package freight, these classes may be subdivided as follows:

Bulk cargo.

- (a) Free flowing. Hard grain, oil in bulk, petroleum, etc.
- (b) Rough bulk. Coal, ore, gravel, limestone, etc.

Package freight or general cargo.

- (a) Miscellaneous package freight. Various sizes and shapes of bundles from steel rods shipped naked to crated motor trucks or locomotives.
- (b) Standardized package freight. Many packages of uniform size,- bags of coffee, sugar,etc., crated canned good, barrels of cement, etc.,

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* Annual Report, Inland Waterway Corp., 1930, p. 9.

bean cake, bales of cotton or wool, hogsheads of tobacco, etc.

(c) Perishables. Also in standard or uniform units - frozen carcasses, crated fruits, bananas in bunches.*

Statistics of inland waterway commerce are compiled showing the tonnage and value for each commodity which in move in immense volume and with more or less regularity on our navigable streams and canals. Minor items are listed collectively as "miscellaneous" or "unclassified".

The Bureau of Foreign and Domestic Commerce of the Department of Commerce place item which enter into commerce into classes or groups of commodities as follows:

1. Animals and Animal Products.
2. Vegetable Food Products.
3. Other Vegetable Products.
4. Textiles.
5. Wood and Paper
6. Nonmetalic Minerals.
7. Ores, Metals, and Manufactures of
8. Machinery and Vehicles
9. Chemicals.
10. Unclassified.**

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* MacElwee, R.S. Port and Terminal Facilities. Harper Brothers, New York, 1926.

** Commerce Year Book. Washington, D.C.

In making the following study, an attempt has been made to avoid controversial issues and to present facts rather than arguments. The chief sources of indebtedness will be evident from the footnotes. Information with regard to the more recent history and to the present condition of the Mississippi Waterway System has been derived mainly from official publications. Of these sources, the Annual Report of the Chief of Engineers, United States Army has been most valuable and comprehensive. A close study has been made of the pages of the daily press. A brief analysis has been made of the factors which promote and facilitate the movement of package freight on our inland channels. Evidences of the present trend to coordinate our rail and waterway systems have been noted.

The Mississippi River with its innumerable tributaries penetrates the very heart of the continent. Rainfall and temperature favorable for many crops has made the Mississippi Basin one of the richest agricultural regions in the world. Within this area is located the greater part of the nation's mineral resources. Excellent transportation facilities have been important factors in the development of this region. Its favorable relief and potential resources have led to the construction of many important railway systems.

The Mississippi waterway system comprises over nine thousand miles of navigable streams. Over 2,500 miles have been modernized to nine feet in depth and about 1,500 miles to a depth of six feet.The Mississippi Basin extends from above Minneapolis to the Gulf and from Pittsburgh on the east to Fort Benton, Montana on the north west.

While it is the avowed purpose of those interested in waterway transportation on the Mississippi and its tributaries to coordinate that traffic into one unified system, it has been necessary for the purpose of making an analysis of that commerce to divide this inland channel into more than thirty geographical divisions. The divisions as outlined by the Corps of Engineers of the United States Army are used in official reports in most cases.

COMMERCE ON THE MISSISSIPPI RIVER AND ITS TRIBUTARIES

	Total bulk freight		Package freight		Total	
	Tons	Value	Tons	Value	Tons	Value
1922	31,658,771	$250,303,817	3,374,670	$481,445,614	35,033,441	$731.749,431
1923	49,593,003	343, 597,009	3,186,085	387,219,577	52,779,088	730,816,586
1924	52,959,122	362,191,924	2,791,567	438,353,697	55,750,689	800,545,621
1925	63,634,110	383,486,089	3,897,368	523,979,349	67,531,478	907,465,438
1926	72,617,278	456,871,592	4,419,202	520,182,130	77,036,480	977,053,722
1927	72,430,378	522,275,338	3,243,927	523,538,105	75,674,305	1,045,813,444
1928	75,222,105	499,388,137	4,572,251	688,382,167	79,794,356	1,187,770,304
1929	71,715,867	424,705,313	6,401,678	710,782,037	78,117,545	1,135,487.350

Sources: Annual Reports of the Chief of Engineers, U.S. Army.

The Missouri River is the longest tributary of the Mississippi. It is navigable as far as Fort Benson, Montana. Package freight traffic on the Missouri is confined almost entirely to the stretch between Sioux City, Iowa and the mouth of the river where it empties into the Mississippi.

The stretch between Fort Benson and Sioux City lies within the states of Montana, North Dakota, and South Dakota. The water traffic between these two cities has consisted of bulk freight. These states are sparcely settled. Montana has a population of 537,606; North Dakota, 680,845; and South Dakota, 692,849. There are no cities in these states with a population exceeding forty thousand and only four cities have a population of over twenty-five thousand.

Montana, North Dakota, and South Dakota are not manufacturing states. In Montana mining is the chief interest while in North Dakota and South Dakota agriculture is the predominating industry. Thus in this region bulk cargo tends to make up almost the entire water traffic.

These states have adequate rail facilities to meet the needs of their present stage of industrial development. In 1927 Montana had 5,037 miles of railroad, the mileage of North Dakota was 5,277 and that of South Dakota 4,245 miles. The Great Northern, Northern Pacific, and the Chicago, Milwaukee & St. Paul Railways pass through this territory.

MISSOURI RIVER, KANSAS CITY TO SIOUX CITY

Navigation season: (1929) March 15, 1929 to November 30, 1929.

	Total bulk freight		Package freight		Total	
	Tons	Value	Tons	Value	Tons	Value
1922	97,399	$171,607			97,399	$171,607
1923	104,875	69,500	55	$825	104,930	70,325
1924	116,847	76,525	796	79,340	117,643	155,865
1925	109,496	131,647	2	30	1o9,498	131,677
1926	103,087	57,061	75	8,750	103,162	65,811
1927	118,442	108,536	50	1,250	118,492	109,786
1928	168,798	156,154	270	13,500	169,068	169,654
1929	208,232	359,369	568	20,042	208,800	379,411

Sources: Annual reports of the Chief of Engineers, U. S. Army.

The next division of the river, including the section between Sioux City and Kansas City, Missouri, passes through a more densely settled region. Sioux City has a population of 79,183 and Kansas City a population of 399,484. The principal city between these points is Omaha, Nebraska, having a population of 214,006. Agriculture and stoch raising are carried on extensively in this region.

The Government has made some improvements on this portion of the river but the controlling depth is yet under four feet. This shallow depth prevents the larger crafts of common carriers entering this territory. As a result, the movement of both bulk and package freight has been relative small. In 1929 the package freight amounted to only 568 tons, having a total value of $20,042 and an average value of slightly over $35 per ton. This would indicate that the package freight was of a very low grade as the average value for this class of merchandise on rivers, canals, and connecting channels Of the United States in 1929 was $128 per ton. Both classes of freight showed a substantial increase over the two previous years.

Navigation on this portion of the river opens about March 15 and closes the last of November. The Chicago, Burlington & Quincy Railroad has a network of lines serving this section and makes through connections with other lines.

MISSOURI RIVER, MOUTH TO KANSAS CITY

Navigation season: (1929) March 1, 1929 to November 30, 1929.

	Total bulk freight		Package freight		Total	
	Tons	Value	Tons	Value	Tons	Value
1922	174,789	192,945	1,763	108,690	176,550	301,635
1923	233,537	317,305	3,353	153,447	236,890	470,752
1924	345,904	692,799	1,419	138,284	347,324	831,084
1925	406,412	655,844	4,487	74,934	410,899	730,778
1926	513,414	834,720	1,010	139,683	514,424	974,403
1927	550,254	1,125,286	1,027	82,119	551,280	1,207,405
1928	812,331	1,966,951	870	88,296	813,201	2,055,247
1929	1,156,283	5,110,179	2,049	145,459	1,158,332	5,255,638

Sources: Annual reports of the Chief of Engineers, U. S. Army.

Between Kansas City and the mouth of the Missouri the controllled depth is yet only four feet. The shallowness of the river thus prevents the large barges from entering this very productive region. Package freight is still a very small percentage of the total traffic. In volumn and value it has fluctuated during the period from 1922 to 1929. Bulk freight, however, has increased rapidly and steadily during this period, rising from 174,789 tons in 1922 to 1,156,283 tons in 1929. The following table show the movement of traffic on this part of the river by classes of commodities and also the direction of this commerce for the year 1929.

Summary of freight traffic on the Missouri River from Kansas City to the mouth for the year 1929.*

Commodity	Tons		
	Up Bound	Down Bound	Total
Animals and Animal Products	41	44	85
Vegetable Food Products	167	174	341
Wood and Paper	27,509	248,336	275,845
Nonmetallic Minerals	151,360	712,606	863,966
Ore, Metal, Manufactures of	329.	1,316	1,645
Machinery and Vehicles	7,876	7,877	15,753
Unclassified	70	627	697
Total	187,352	970,980	1,158,332

* Annual Report of the Chief of Engineers, U.S. Army.

MONONGAHELA RIVER Pa. and W. Va.

Stretch included: Pittsburgh, Pa. to Fairmont W. Va. 127 miles. Navigation season:362 days.

	Total bulk freight		Package freight		Total	
	Tons	Value	Tons	Value	Tons	Value
1922	14,106,497	$72,764,086	300,632	$29,237,671	14,407,129	$102,001,757
1923	22,686,206	89,419,135	873,818	61,896,301	23,560,024	151,315,436
1924	21,673,397	95,620,786	205,418	27,734,285	21,878,815	123,355,071
1925	23,546,741	108,117,308	167,380	13,205,002	23,716,121	121,322,310
1926	26,285,088	107,911,777	89,594	9,893,748	26,374,682	117,805,525
1927	25,807,898	130,231,782	65,131	5,528,548	25,873,029	135,760,330
1928	27,021,398	149,023,961	390,745	21,950,597	27,412,143	170,974,558
1929	27,166,041	84,106,454	1,741,573	82,015,122	28,907,614	166,121,576

Sources: Annual Reports of the Chief of Engineers, U. S. Army.

At Pittsburgh the Monongahela River and the Allegheny River join to form the Ohio River. This tributary of the Mississippi may be considered one of our most important waterways. Its valley extends nearly east and west, the direction of our largest freight movement. It penetrates one of the leading coal and industrial regions of the United States. Although manufacturing predominates, agriculture is very important in the Ohio Valley.

The Monongahela River is navigable from Pittsburgh, Pennsylvania to Fairfield, West Virginia, a distance of 127 miles. Practically all of the commerce is restricted to the reach between Morgantown, West Virginia and Pittsburgh, a distance of 101 miles.

Package freight traffic has shown a remarkable increase on the Monongahela River. In 1929 this class of merchandise amounted to 1,741,571 tons. This was more than four times the tonnage of 1928 and twenty six times the tonnage of 1927.

For the year 1929 the tonnage was distributed as follows:[*]

Coal	80.2%	Sand	4.2%
Coke	4.6%	Iron and Steel	5.6%
Gravel	3.5%	Miscellaneous	1.9%

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[*] Annual Report of the Chief of Engineers, U.S. Army.

The Youghiogheny River rises in Maryland and flows north into the Monongahela River at the city of McKeesport. There is practically no package freight. In 1929 coal constitutied 62.9 per cent and sand and gravel 33.7 per cent of the total traffic. The Baltimore & Ohio Railroad follows the bank of this river for some distance. Many large industrial plants including the McKeesport Tin Plate Company, one of the largest plants of its kind in the United States, are located on the banks of this stream. Many of these companies are considering the shipment of a portion of their package merchandise by water routes when transportation facilities are developed either by themselves or by common carriers.

The principal navigable portion of the Allegheny River extends from Pittsburgh to Killanning, Pa,a distance of forty six miles. The greater part of the traffic, over 92 per cent, is restricted to the reach between Freeport, Pa. and Pittsburgh. Only a small amount of package freight is moved on this waterway. The Pennsylvania Railroad has a branch from Pittsburgh to Buffalo, New York which runs parallel to the Allegheny River as far as Oil City, Pa. Another branch of this railroad follows the Allegheny valley from Oil City north east to Olean, New York and from there south east to Port Allegheny, Pa.*

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* Official Guide of the Railways, published by the National Railway Publication Co., New York, N. Y.

ALLEGHENY RIVER, PA.

Stretch included: Pittsburgh, Pa. to Kittanning, Pa. 46 miles. Navigation season: 351 days.

	Total bulk freight		Package freight		Total	
	Tons	Value	Tons	Value	Tons	Value
1922	3,986,426	$10,404,361	29,314	$3,131,130	4,015,740	$13,535,491
1923	4,543,413	9,157,906	165,719	8,334,120	4,709,132	17,492,026
1924	4,280,972	8,849,436	58,539	3,046,809	4,339,511	11,896,245
1925	4,715,295	7,301,967	39,743	3,064,098	4,775,038	10,366,065
1926	3,756,389	7,793,221	5,350	64,200	3,761,739	7,857,421
1927	3,842,159	8,784,830	18,788	225,456	3,860,947	9,010,286
1928	3,672,733	9,243,746	19,851	901,120	3,692,584	10,144,866
1929	3,760,990	9,709,738	22,568	1,202,955	3,783,558	10,912,693

Sources: Annual reports of the Chief of Engineers, U. S. Army.

The Ohio River, since 1930, has had a controlled depth of nine feet from Pittsburgh to the mouth at Cairo, Illinois. The distance from Pittsburgh to Cairo by water is 979 miles. Along the banks of this channel are situated some of the country's most important manufacturing and commercial cities and towns. Among the the more important industrial centers having a population of about twenty five thousand or more are the following;

Cities	Miles below Pittsburgh.**	Population 1930.*
Pittsburgh, Pa.		669,742
East Liverpool, Ohio	43.5	23,197
Stewbenville, Ohio	68.0	35,418
Wheeling, W. Virginia	90.5	61,659
Parkersburgh, W. Virginia	184.6	29,623
Huntington, W. Virginia	308.3	75,572
Ashland. Kentucky	322.6	29,050
Portsmouth, Ohio	356.0	42,536
Newport, Kentucky	469.8	29,740
Cincinnati, Ohio	470.2	449,331
Covington, Kentucky	471.9	65,247
Evansville, Indiana	792.3	103,151
Paducah, Kentucky	934.4	33,541
Cairo, Illinois	979.3	13,532

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* 15th Census of the United States, 1930.

** Table of Distances between Ports. Hydrographic Office, Washington, D.C.

Summary of freight traffic on the Ohio River from Pittsburgh to the mouth for the years 1928, 1929.*

Class of Commodity	1928 Tons	1929 Tons
Animals and Animal Products	14,015	10,885
Vegetable Products	39,670	26.014
Textiles	883	1,215
Wood and Paper	396,169	318,571
Nonmetallic Minerals		
Coal and Coke	9,160,766	9,751,374
Sand, Gravel and Stone	9,176,788	9,074,211
Oil and Gasoline	......	590,269
Others	561,688	358,819
Ore,Metal,&Manufactures of	1,346,584	1,595,120
Machinery and Vehicles	66,631	70,580
Chemicals	39,390	37,685
Unclassified	135,683	120,405
Total	20,938,267	21,955,148

Ton-miles, 1928 1,344,687,000

Ton-miles 1929 1,512,584,740

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* Annual Reports of the Chief of Engineers, U.S.Army.

The Ohio Valley has long been one of our most important manufacturing, mining, and agricultural regions. With a channel 979 miles long having a controlled depth of nine feet and with a navigation season extending through the entire year, transportation on this river is destined to be an important factor in the further development of the territory. Modern terminals are being erected at the larger industrial centers by both the municipalities and common carriers who are increasing their facilities.

With adequate terminals and floating equipment, package freight traffic is destined to show a larger percentage of increase than bulk freight. Coal, sand, and gravel have in the past constituted the greater part of the tonnage handled. Since the channel has been increased to nine feet in depth, some of the larger modern barges are making regular trips on the Ohio through to New Orleans. On long hauls there is a marked saving by shipping package freight by water. One of the largest common carriers has now established regular service between Cincinnati and New Orleans.

The Pennsylvania Railroad System, the Chesapeake & Ohio, the Baltimore & Ohio, and other smaller systems serve this territory. There is an effort being made to coordinate rail and water transportation facilities in this region. Pittsburgh shippers advocate

OHIO RIVER, PITTSBURGH TO MOUTH

Stretch included: Pittsburgh, Pa. to Cairo, Ill. 979 miles. Navigation season: Entire year.

Controlling depth 7 feet.

	Total bulk freight		Package freight		Total	
	Tons	Value	Tons	Value	Tons	Value
1922	5,393,800	22,834,498	898,025	121,961,752	6,291,825	144,796,250
1923	7,862,807	66,748,947	417,713	43,273,306	8,280,520	110,022,253
1924	10,335,439	71,072,453	531,244	57,283,565	10,866,683	128,356,018
1925	14,654,203	45,749,455	1,082,869	105,872,787	15,737,072	151,622,242
1926	18,814,141	53,941,076	940,837	96,145,147	19,754,978	150,086,223
1927	19,872,311	118,121,706	256,207	50,301,198	20,128,518	168,422,904
1928	20,608,312	140,225,019	329,955	51,294,149	20,938,267	191,519,168
1929	21,810,417	153,121,728	144,731	39,186,745	21,955,148	192,308,473

Sources: Annual reports of the Chief of Engineers, U. S. Army.

the construction of two terminals, one for package and the other for carload movement. The package freight terminal at Manchester, North Side, Pittsburgh, involves improvement of existing facilities and seems to be definitely assured for the coming year.*

The Ohio has a number of important tributaries which act as feeders for the main channel. The more important of these streams which carry freight traffic are the Muskingum, Kanawha, Big Sandy, Kentucky, Green, Cumberland, and Tennessee rivers. All but one of these streans, the Muskingum, flow from the south.

The Tennessee River is the longest tributaty of the Ohio. It is formed by the junction of the French Broad and Holston rivers at Knoxville, at the central portion of east Tennessee. It there flows southwestwardly into Alabama to the line of Mississippi and from there it flows north across the state of Tennessee and through Kentucky and empties into the Ohio at Paducah, Kentucky. From Paducah, to Knoxville, Tennessee is a distance of about six hundred and fifty-two miles.

The Tennessee Valley is destined to become one of our great industrial centers. There is abundant water power to be developed and the region contains some of the finest farming land in the Unites States.

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* Iron Age, Jan. 8, 1931. p. 151.

Package freight on the Tennessee river increased from 111, 917 tons in 1928 to 123,531 tons on 1929, an increase of 5.65 per cent. The total tonnage decreased 3.5 per cent below the preceding year. The decrease in total tonnage was due principally to the decrease in sand and gravel shipments. Existing commerce is generally being handled at great disadvantage due to the lack of more suitable warehouses, transfer facilities, and wharves. This condition undoubtedly has discouraged transportation on the river.

There are few modern terminals for the handling of package freight on the Tennessee River. Modern river terminals, municipally owned, have been constructed at Chattanooga, Tennessee. The other public terminals are mostly unimproved landings. There are many unimproved landings, most of which are open to the public use without charge. Some of these landings have warehouses or sheds where the owner receives and cares for freight at reasonable charges. There are also various river-rail transfers constructed by the railroads for the interchange of freight. These terminals are generally open to the public without charge on shipments moving over the respective railroad which ownes the terminal.*

Up to the present time terminal and transfer facilities have not kept pace with the industrial growth

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* Annual Report of the Chief of Engineers, United States Army. p. 1282.

of the region. When the potential water power of this stream is utilized, it may be expected that the Package freight traffic will grow in proportion.

The most important northern tributary of the Ohio River is the Muskingum River. This stream is formed near Coshocton, Ohio and empties into the Ohio River at Marietta, Ohio. There are numerous small warehouses privately owned in cities and towns along the river. There are also public and private landings usually unimproved. None of the landings or warehouses have physical connection or arrangements for interchange of traffic with railways. The facilities appear to be adequate for existing commerce which consists of sand, gravel, farm produce, lumber, and inbound coal.

The navigable portion of the Muskingum extends from the mouth to Dresden, Ohio, a distance of ninty-one miles. The controlled depth is six feet. In 1929 the commerce on this stream consisted of 27 tons of package freight of a miscellaneous character and 1,555 tons of bulk freight.

The Wabash River is another northern tributary of the Ohio. It rises in western Ohio and empties into the Ohio River at a point 121 miles from the mouth of the Ohio River. There are no public terminals and no commerce has been reported on this stream. Terre Haute, the largest city on the Wabash decreased in population from 66,083 in 1920 to 62,543 in 1930.

The Green River with its tributary, the Barren River, is another channel of commerce from the south leading to the Ohio. The Green River rises in Green County, Kentucky and empties into the Ohio about eight miles above Evansville, Indiana. The Head of navigation on the Green River is at Mammoth Cave, Kentucky, 196 miles from the mouth of the river. The Barren River rises in Barren County, Kentucky and flows north west and empties into the Green River. The head of navigation on the Barren River is at Bowling Green, Kentucky about thirty miles above the mouth of the river and 179 miles above the mouth of the Green River.

At Bowling Green, Kentucky there is a public paved landing and a private wharf and warehouse. There is also a railroad incline and derrick which may be used by the public upon payment of fixed charges for transfer of freight from rail to water or vice versa. There are about fifty unimproved landings and small warehouses situated at various points of this channel. These warehouses are generally controlled by the Evansville & Bowling Green Packet Company.

The commerce on this waterway consisted in 1929 of 23,569 tons of package freight valued at $4,013,278 and 530,920 tons of bulk freight valued at $4,637,766. While the total commerce for the year 1929 was 6 per cent or 37,543 tons less than 1928, the volume of

GREEN AND BARREN RIVERS, KENTUCKY.

Navigation season: Practically all the year. Controlling depth 5 feet.

	Total bulk freight		Package freight		Total	
	Tons	Value	Tons	Value	Tons	Value
1922	266,607	$435,812	27,602	$6,520,726	294,209	$6,956,538
1923	322,869	3,690,190	29,441	4,789,273	352,310	8,479,463
1924	431,291	4,453,762	23,574	3,746,169	454,865	8,199,931
1925	456,444	3,974,982	25,649	4,075,842	482,093	8,050,824
1926	419,283	3,888,812	21,553	3,243,287	440,836	7,132,099
1927	502,894	4,770,533	19,245	3,411,795	522,139	8,182,330
1928	568,472	5,838,907	21,667	3,802,181	590,139	9,641,088
1929	530,929	4,637,766	23,569	4,013,278	554,498	8,651,044

Sources: Annual reports of the Chief of Engineers, U.S. Army.

package freight showed an increase for the same period of nearly two thousand tons. For the year 1929 the total tonnage was distributed as follows:

Rock Asphalt	58.3%	Sand	3.1%
Coal	25.3%	Miscellaneous	4.4%
Logs, Lumber, and Ties	8.9%		

The Cumberland River rises in Harlan County, Ky. and empties into the Ohio River near Smithlands, Ky. The head of nagigation is at Burnside, Kentucky, which is about five hundred miles from the mouth of the river.

The city of Nashville, Tennessee is the principal industrial center on the Cumberland River. At this point there is a 5 story terminal building 300 feet long and 140 feet wide having large and convenient loading platforms. . The terminal is equipped with 3 large freight elevators, a traveling crane, and a belt conveyor, all of which are electrically operated. The terminal is owned by the city of Nashville and open to public use. There are two railway inclines for the transferring of freight between cars and river vessels. These are are privately owned but open to public use at present.*

There are warehouses at Dover, Tenn. and Clarksville, Tenn. which are open to public use. At Fox

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* Annual Report of the Chief of Engineers, U.S. Army. vol. II, p. 1273.

Bluff. Tenn. there is a rail incline which is owned by the Tennessee Central Railway Company but open to public use. There are two privately owned warehouses at Burnside, Kentucky which are open to public use. At Carthage, Tenn. there is a railway incline and belt conveyor, both privately owned but open to public use. There are many private landings and numerous sheds and warehouses without regular attendants, where the owner receives and cares for freight at reasonable charges.

On the stretch between the mouth and Nashville, a distance of 192 miles, the traffic consists of about 20% forest products, 40% sand, 33% stone, and 7% general merchandise or package freight. On the stretch between Nashville, Tenn. and Burnside, Kentucky, a distance of about 326 miles the principal commerce is bulk cargo.

The Kanawha River is entirely in the state of West Virginia. It empties in the Ohio at Point Pleasant, W. Virginia. About the only terminal facilities on this river consist of paved wharfs and wharf boats. There is a freight terminal at Charleston where freight may be transferred fron barge to car or vice versa.

The existing terminals on the Kanawha River are inadequate for any extensive shipping. It is evident that lack of facilities have been a contributing cause for the decline in package freight traffic.

The Little Kanawha River rises in West Virginia and empties into the Ohio at Parkersburgh, W. Va. It is improved for a distance of forty-eight miles from the mouth. The only terminal facilities on the river are a large wharf boat at Parkersburgh and a small wharf boat at Burning Springs. The wharf boats are privately owned but available for public use. The Baltimore & Ohio Railway Company maintaines a warehouse at the terminous of its Little Kanawha River branch at Owensport, 32 miles from the mouth of the river, at which place transfers are made between boats and railroad. Very little package freight is transported on this stream. The facilities are considered adequate for the present volume of commerce now handled.*

The Kentucky River is formed near Beattyville, Ky. and empties into the Ohio at Carrollton, Kentucky. No terminals exist for the handling of package freight, which may be considered in any way adequate. There are a number of small and poorly kept warehouses along the stream. Such facilities as exist are open for profit and are privately owned.

The principal down stream commerce is timber in the log, oil, and coal. The inbound commerce consists for the most part of package freight. In 1929 the package freight moved on the river amounted to 3.638 tons valued at $540,574.

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* Annual Report of the Chief of Engineers, U. S. Army, vol. II, p 1358.

The Big Sandy River rises in Kentucky and empties into the Ohio at Catlettsburg,Kentucky about ten miles below Huntington, West Virginia. There are no public terminals and no physical connection between rail and river traffic. Practically no package freight is carried on this stream.

The navigable portions of the Arkansas River, the White River, and the Black River are almost entirely within the state of Arkansas. These streams are shallow during most of the year and will not accommodate large barges of the Mississippi.

The White River rises in Arkansas and empties into the Mississippi about forty-five miles above Arkansas City. There are no public terminals. Nearly seventy-five per cent of the traffic consists of forest products and large amounts of sand and gravel are transported. The package freight in 1929 amounted to about 270 tons valued at about seventeen thousand dollars.

The Black River, a tributary of the White River, rises in Missouri and empties in the White River at Jacksonport, Arkansas. There are no public terminals and very little package freight is moved on this stream.

The navigable portion of the Arkansas River extends into the state of Oklahoma. There is practically no package freight carried execpt a very small amount on the stretch below Little Rock, Arkansas.

OUACHITA AND BLACK RIVERS, ARKANSAS AND LOUISIANA.

Stretch included: From mouth of the Black River to Camden, Arkansas. Controlling depth 6.5 feet. Navigation season: Entire year.

	Total bulk freight		Package freight		Total	
	Tons	Value	Tons	Value	Tons	Value
1922	145,015	$1,501,270	4,666	$1,173,520	149,681	$2,674,790
1923	100,083	764,125	4,062	764,887	104,145	1,529,012
1924	124,994	937,593	6,075	1,186,498	131,069	2,124,091
1925	283,975	1,216,690	7,490	1,553,677	291,465	2,770,367
1926	332,277	3,383,147	40,997	5,719,048	373,274	9,102,195
1927	320,151	4,557,999	6,573	1,934,916	326,724	6,492,915
1928	351,649	1,341,293	49,151	6,486,126	400,800	7,827,419
1929	386,938	4,600,556	42,604	5,049,672	429,542	9,650,228

Sources: Annual report of the Chief of Engineers, U. S. Army.

The navigable portions of the Red River and the Ouachita River are confined within the states of Arkansas and Louisiana. The Ouachita River is used for both package and bulk freight but the traffic on the Red River is largely bulk freight. More than forty thousands tons of package freight was transported on the Ouachita River while less than three thousand tons were carried on the Red River.

The St. Francis River, the Big Sunflower River, the Yazoo River, and the Tallahalchie River all carry a small amount of package freight but they are used principally for transporting bulk freight.

The Illinois River is entirely within the state of Illinois. It is formed by the confluence of the Kankakee and the Des Plaines Rivers and empties into the Mississippi River at Grafton, Illinois, about 36 miles above St Louis.

Peoria, the largest city on this river, makes a charge for the use of the public docks. None of the other cities and towns along this river make a similar charge. Five of the cities own dock frontage which is more or less improved for boat landing. Four of the towns own frontage on which no improvements have been made. The tonnage of package freight was much greater in 1929 than in the year 1928 while the bulk freight decreased for the same period, caused by the shortage of the apple crop in 1929.

ILLINOIS RIVER

Stretch included: La Salle, Ill. To Grafton, Ill. 223 miles. (Wholly within the state of Illinois). Controlling depth 7 feet. Project depth 9 feet. Navigation season (1929): March 4, 1929 to December 1, 1929.

	Total bulk freight		Package freight		Total	
	Tons	Value	Tons	Value	Tons	Value
1922	168,153	$1,850,785	28,572	$3,708,765	196,725	$5,559,550
1923	132,460	2,942,314	41,618	4,004,142	174,078	6,946,456
1924	87,620	2,371,529	35,156	4,368,310	122,776	6,739,839
1925	96,080	4,828,588			96,080	4,828,588
1926	93,733	2,019,531	22,532	2,034,331	116,265	4,053,862
1927	59,080	1,222,862	15,762	1,666,484	74,842	2,889,346
1928	54,349	1,846,581	18,357	2,183,248	72,706	4,029,829
1929	7,611	48,573	53,298	2,904,280	60,909	2,952,853

Sources: Annual Reports of the Chief of Engineers, U. S. Army.

The Mississippi River is navigable from the Gulf to Minneapolis, Minnesota. The stretch between the mouth of the Missouri and Minneapolis is designated as the Upper Mississippi and that portion of the river below the mouth of the Missouri to the Gulf is known as the Lower Mississippi.

Like the Missouri and the Ohio, the Upper Mississippi may be thought of as being merely a tributary of the Lower Mississippi. The distance from the head of navigation at Minneapolis to the mouth of the Missouri is 667 miles and from the mouth of the Missouri to St. Louis, six miles.

The total traffic on the Upper Mississippi in 1929 was about equal to that of the Missouri River and only about five per cent of the total tonnage of the Ohio. The stretch between Minneapolis and the mouth of the Wisconsin River has a controlled depth of only 4.5 feet and from the mouth of the Wisconsin River to the mouth of the Illinois River the controlled depth is five feet. The shallowness of this portion of the river prevents the larger barges of the Mississippi from navigating this portion of the stream.

This region is well served by railways and as it is very close to the head of the lakes much of the traffic moves in the direction of the lake ports on its way to eastern markets.

Summary of Freight Traffic on the Mississippi River between the Wisconsin River and the Mouth of the Illinois River by Classes of Commodities for the Year 1929.

Commodities	Up Bound Tons	Down Bound Tons	Total
Animals and Animal Products	1,953	1,679	3,632
Vegetable Products	23,160	18,087	41,247
Textiles	10,880	327	11,207
Wood and Paper	2,321	15,646	17,967
Nonmetallic Minerals	113,800	319,914	433,714
Ores, Metals, and Manufactures of	21,857	505	22,362
Machinery and Vehicles	9,496	4,126	13.622
Chemicals	9,095	1,085	10,180
Unclassified	3,457	1,464	4.921

Source: Annual Report of the Chief of Engineers, U. S. Army.

Summary of freight traffic on the Mississippi River from Minneapolis to the mouth of the Wisconsin River for the year 1929.*

Commodity	Tons
Animals and Animal Products	1,895
Vegetable Food Products	20,270
Textiles	11,357
Wood and Paper	7,303
Nonmetallic Minerals	5,890
Ores, Metals, and manufactures of	22,034
Machinery and Vehicles	11,465
Chenicals	6,102
Unclassified	4,077
Total	90,393

The movement of textiles was practically all up stream. Most of the machinery and vehicles moved in the same direction. The principal vegetable food products which moved up the river were sugar, sirup and molasses, beverages, coffee and fruit. Agricultural impliments amounting to 8,274 tons were included in the upbound freight. Included in this commerce were

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* Annual Report of the Chief of Engineers, U.S. Army.

Summary of Freight Traffic on the Mississippi River Between the Illinois River and Ohio River by Classes of Commodities for the Year 1929.

Commodities	Up Bound Tons	Down Bound Tons	Total
Animals and Animal Products	6,778	3,699	10,477
Vegetable Food Products	122,671	119,557	242,228
Other Vegetable Products	2,470	602	3,072
Textiles	42,556	3,699	46,255
Wood and Paper	41,123	39,324	80,447
Nonmetallic Minerals	57,912	232,429	290,341
Ores, Metals, and Manufactures of	12,782	37,453	50,235
Machinery and Vehicles	1,330	29,839	31,169
Chemicals	15,286	26,548	41.834
Unclassified	7,078	88,620	95.698
Total	309,986	581,770	891.756

Source: Annual Report of the Chief of Engineers, U. S. Army.

Consolidated Statement of Freight Traffic on the Mississippi River between the Ohio River and Minneapolis, Minn. by Classes of Commodities for the Year 1929.

Commodities	Up Bound Tons	Down Bound Tons	Total
Animals and Animal Products	8,077	5,700	13,777
Vegetable Food Products	127,134	120,654	247,788
Other Vegetable Products	2,470	602	3,072
Textiles	42,628	3,757	46,385
Wood and Paper	48,724	55,261	103,985
Nonmetallic Minerals	172,059	552,794	724,853
Ores, Metals, and Manufactures of	27,579	37,632	65,211
Machinery and Vehicles	11,058	30,601	41,659
Chemicals	17.741	26,649	44,390
Unclassified	9,330	89,812	99,142
Total	466,800	923,462	1,390,262

Source: Annual Report of the Chief of Engineers, U. S. Army.

radiators and stoves, iron pipe, bottles, and books. Wheat, amounting to 6, 767 tons was included in the down bound traffic.

The total traffic on the stretch on the Mississippi between the Wisconsin River and the mouth of the Illinois River was 558,852 tons of which,196,019 tons moved up stream and 362, 833 tons moved down stream. On this section the down bound shipments exceded the up bound. This was due in large measure to the movement of nonmetallic minerals.

A consolidated statement of the total tonnage on the Mississippi between the Ohio River and Minneapolis shows a freight movement amounting to 1,390,262 tons. The commerc of the lower portion of this section was more diversified than than that of the upper section. The large commercial center of St. Louis is located on this part of the river.and contributes a large amount to this commerce.

The Lower Mississippi between the mouth of the Ohio at Cairo and New Orleans.is generally divided for the purpose of analysis into three divisions. The first division includes the stretch between New Orleans and Vicksburg, a distance of 367 miles. The second division extends between Vicksburg and Memphis, a distance of 375 miles. The third division includes the stretch between Memphis and Cairo, a distance of 227 miles.

MISSISSIPPI RIVER BETWEEN VICKSBURG AND NEW ORLEANS, LA.

Stretch included: 367 miles. Controlling depth 9 feet. Navigation season: Entire year.

	Total bulk freight		Package freight		Total	
	Tons	Value	Tons	Value	Tons	Value
1922	1,133,183	$28,742,372	563,636	$91,655,355	1,695,819	$120.397,727
1923	5,065,318	89,267,513	427,979	84,149,398	5,493,297	173,416,911
1924	7.104,894	108,334,581	528,383	109,164,928	7,633,277	217,499,509
1925	8,211,613	133,047,382	890,037	141,008,256	9,101,650	274,055.638
1926	10,195,244	179,485,292	879,244	124,762,161	11,074,488	304,247,453
1927	7,957,410	121,657,003	859,335	150,137,509	8,816,745	271,794,512
1928	7,377,527	98,910,654	1,277,099	188,962,028	8,654,626	287,872,682
1929	6,522,451	100,281,252	1,204,932	128,604,087	7,727,383	228,885,339

Sources: Annual Reports of the Chief of Engineers, U.S. Army.

MISSISSIPPI RIVER BETWEEN MEMPHIS AND VICKSBURG

Stretch included: 367 miles. Controlling depth 9 feet. Navigation season: Entire year.

	Total bulk freight		Package freight		Total	
	Tons	Value	Tons	Value	Tons	Value
1922	851,537	$25,006,213	589,511	$107,416,566	1,441,048	$132,422,779
1923	1,035,655	17,306,293	417,182	69,496,573	1,452,837	86,802,866
1924	1,143,860	12,503,762	522,580	106,904,418	1,666,440	119,408,180
1925	2,546,020	26,681,427	666,239	117,914,642	3,212,259	144,596,069
1926	3,616,619	30,803,096	1,176,161	148,636,648	4,792,780	179,439,744
1927	3,460,256	47,797,624	897,841	165,227,980	4,358,097	213,025,604
1928	3,821,831	32,244,404	982,009	207,168,419	4,803,840	239,412,823
1929	1,371,797	11,394,855	1,463,263	219,443,932	2,835,060	230,838,787

Sources: Annual reports of the Chief of Engineers, U. S. Army.

MISSISSIPPI RIVER BETWEEN CAIRO AND MEMPHIS

Stretch included: 227 miles. Controlling depth 9 feet. Navigation season: Entire year.

	Total bulk freight		Package freight		Total	
	Tons	Value	Tons	Value	Tons	Value
1922	535,929	$19,941,247	387,457	$67,410,462	923,386	$87,351,709
1923	737,346	15,653,051	310,976	47,711,923	1,048,322	63,364,974
1924	771,219	10,161,433	381,802	69,894,138	1,153,021	80,055,571
1925	1,220,945	17,882,840	467,709	77,044,549	1,688,654	94,927,389
1926	946,989	18,563,972	713,199	76,697,114	1,660,188	95,261,086
1927	1,590,587	42,501,656	553,730	84,005,661	2,144,317	126,507,317
1928	1,690,352	15,784,700	840,904	120,930,207	2,531,256	136,714,907
1929	1,272,903	20,109,093	1,055,431	129,941,676	2,328,334	150,050,769

Sources: Annual reports of the Chief of Engineers, U. S. Army.

The Lower Mississippi now has a number of well equipped barge lines offering regular and through service. The Inland Waterway Corporation has been operating between New Orleans and St. Louis. Within the last two years the Mississippi Valley Barge Line Company and the American Barge Line Company have been formed. The Mississippi Valley Barge Line Co. operates between New Orleans and Cincinnati, Ohio. This company owns and maintains terminals at the more important cities and transfer points along the route.

The Inland Waterway Corporation publishes a very complete record of its activities. A record is kept of the tonnage carried by this line for each commodity. The reports for 1929 and 1930 list about ninty items or classes of commodities. This list not only shows the variety of products carried but also shows the the relative importance of each on a tonnage basis.

On the divisions of the Mississippi between Vicksburgh and New Orleans both package and bulk freight show a decline from the 1928 figure as compared with the freight traffic of 1929. On the divisions between Vicksburg and Memphis and from there to Cairo the package freight traffic of 1929 was above that of 1928 while the bulk freight showed a decline on both sections for the same period. In value however the package freight declined in 1929 from the year 1928 on all section of the lower Mississippi.

CLASSIFIED STATEMENT OF TONNAGE HANDLED BY THE INLAND WATERWAY CORPORATION ON THE LOWER MISSISSIPPI DIVISION BETWEEN ST. LOUIS AND NEW ORLEANS FOR THE CALENDAR YEARS 1929 and 1930.

Commodity	1929 tons	1930 tons
Wheat, bulk	97,395	174,680
Wheat, sacked	......	100
Corn, bulk	55,327	9,378
Oats, bulk	401	1,245
Oats, sacked	311	241
Barley, bulk	6,261	.....
Rye, bulk	879	.....
Rice	13,026	16,309
Flour	1,351	3,103
Other mill products	1,114	330
Tobacco	13,306	17,208
Cotton	94,674	80,403
Cotton linter, noils	12,297	14,594
Cottonseed meal, cake	100	.....
Dried fruit and vegetables	1,012	1,191
Coffee	18,257	20,002
Sisal	29,424	16,009
Other products of agriculture	3,992	2,960
Packinghouse products, edible	125	.....
Leather	5	.....
Animal products	277	813
Bituminous coal dust	5	.....
Ore, iron	5	.....

Ore, Bauxite	138,928	....
Other ores	9,250	8,613
Salt	364	920
Rock, phosphate	.....	2,810
Asphalt petroleum	224	.....
Sulphur	8,540	61,231
Products of mines	3,149	2,386
Lumber and forest products	1,342	724
Chicle	2,897	3,285
Gasoline and greases	104	188
Linseed oil	60	94
Sugar	392,676	332,319
Sirup, edible	15,494	13,531
Molasses, blackstrap	70	......
Pig iron	117	866
Billets, iron and steel	3,081	139
Rails and materials	309	167
Cast iron	1,787	1,287
Pipe fittings	13,053	8,646
Nails and wire	8,473	4,157
Bar and structural steel	41,073	47,372
Copper and lead	939	74
Machinery	2,061	1,865
Kalsomine, brick	20	.....
Piling, concrete	.....	1,947
Agricultural implements	33,413	23,938
Railway car wheels	1,361	545
Motor vehicles and parts	4,125	28,942

Furniture	1,919	1,134
Beverages	6,299	6,607
Fertilizer and oyster shells	9,400	14,147
Paper, news print and printing	2,086	106
Alcohol	3,330	1,358
Acid, sulphuric	32	.....
Explosives, arms	8,761	2,221
Bagging, bags	24,024	35,258
Canned goods	55,590	56,989
Paint and varnishes	2,265	1,469
Paper, wrapping and bags	2,770	2,760
Pulp board	1,757	176
Roofing paper	7,311	3,766
Soap	6,673	5,516
Glass, flat, tumbler	5,520	7,415
Bags, cotton	121	.....
Baking powder	1,718	1,435
Cordage	1,874	4,890
Corn sugar	449	.....
Feed, animal	405	.....
Glass articles	450	.....
Ink	1,140	864
Iron and steel,,manufactured	30,692	15,200
Matches	4,910	2,239
Medicines and toilet preparations	4,544	3,588
Cattle dip, oils	3,182	.....
Paint and putty	778	.....
Paper articles	3,536	4,151

Paper stock	1,103	476
Radiators and stoves	3,199	2,006
Refrigeration	887	847
Sodium	6,283	8,412
Ware, metal and stone	4,463	2,664
Wood pulp	2,089	8,432
Miscellaneous	27,497	29,886
Merchamdise	25,355	21,268
Total	1,292,816	1,149,864

Summary of Freight Traffic on the Mississippi River between Memphis, Tennessee and Vicksburg, Miss. by Classes of Commodities for the Year 1929.

Commodities	Up Bound Tons	Down Bound Tons	Total
Animals and Animal Products	6,963	545	7,508
Vegetable Food Products	426,314	216,012	642.326
Other Vegetable Products	5,241	12,077	17,318
Textiles	55,430	70,501	125,931
Wood and Paper	211,750	331,854	543,604
Nonmetallic Minerals	249,429	337,559	586,988
Ores, Metals, and Manufactures of	142,768	175,113	317,881
Machinery and Vehicles	161,241	205,762	367.003
Chemicals	14,621	25,922	40,543
Unclassified	88,686	97,272	185,958
Total	1,362,443	1.472,617	2,835,060

Source: Annual Report of the Chief of Engineers, U. S. Army.

Summary of Freight Traffic on the Mississippi River between Cairo, Ill. and Memphis. Tennessee by Classes of Commodities for the Year 1929.

Commodities	Up Bound Tons	Down Bound Tons	Total
Animals and Animal Products	5,556	649	6,205
Vegetable Food Products	315,740	224,328	540,068
Other Vegetable Products	5,602	1,222	6,824
Textiles	57,752	4,590	62,342
Wood and Paper	48,756	310,663	359,409
Nonmetallic Minerals	102,394	583,816	686,210
Ores, Metals, and Manufactures of	142,789	389,948	532,737
Machinery and Vehicles	753	42,975	43,728
Chemicals	14,558	48,533	63,091
Unclassified	5,119	22,591	27,710
Total	699,019	1,629,315	2,328,334

Source: Annual Report of the Chief of Engineers, U. S. Army.

Summary of Freight Traffic in the Mississippi River between Vicksburg, Miss. and New Orleans by Classes of Commodities for the Year 1929.

Commodities	Up Bound Tons	Down Bound Tons	Total
Animals and Animal Products	12,283	1,729	14.012
Vegetable Food Products	450,539	213,559	664,098
Other Vegetable Products	5,281	11,976	17.257
Textiles	53,563	100,350	153,913
Wood and Paper	27,027	84,809	111.836
Nonmetallic Minerals	339.105	1,502,359	1,841,464
Ores, Metals, and Manufactures of	154,191	173,494	327.685
Machinery and Vehicles	615	38,966	39.581
Chemicals	14,785	21,051	35,836
Unclassified	7,609	217,764	225,373
Total	1,064,998	2,366.057	3,431.055

Source: Annual Report of the Chief of Engineers, U. S. Army.

Package freight traffic on the Mississippi and its tributaries has shown a substantial increase during the past eight years. The decline in volume in the years 1924 and 1927 may be accounted for by the fact that both years were marked by commercial depression which was national in its extent. It was also in 1927 that a disastrous flood occurred in the Mississippi Valley.

Package freight on Federal, State, and Private canals has also shown a tendency to increase during the past few years. In the years 1926,1927, and 1928, package freight on the canals exceeded in tonnage that class of traffic on the Mississippi and its tributaries. In 1929, however, the volume of package freight carried on the Mississippi Waterway System was greater than the volune of package freight transported on the Federal, State, and Private canals of the United States.

COMMERCE ON STATE AND PRIVATE CANALS

	Total bulk freight		package freight		Total	
	Tons	Value	Tons	Value	Tons	Value
1922	2,346,344	$41,991,364	640,531	$378,911,982	2,986,875	$420,903,346
1923	3,026,614	35,514,267	1,132,322	452,792,603	4,158,936	488,306,870
1924	4,109,980	60,209,062	1,142,244	267,117,848	5,252,224	327,326,910
1925	5,336,322	68,968,978	1,257,515	291,908,677	6,593,837	360,877,655
1926	5,337,361	421,129,152	502,089	37,958,338	5,839,450	459,087,490
1927	5,004,497	126,479,732	1,337,346	337,005,260	6,341,843	462,484,992
1928	3,776,379	95,085,994	1,157,861	153,182,955	4,934,240	248,268,949
1929	4,032,717	93,011,536	1,279,214	189,994,720	5,311,931	283,006,256

Sources: Annual reports of the Chief of Engineers, U. S. Army.

COMMERCE ON FEDERAL CANALS

	Total bulk freight		Package freight		Total	
	Tons	Value	Tons	Value	Tons	Value
1922	69,233,299	$797,903,024	1,948,400	$307,385,189	71,181,699	$1,105,288,213
1923	95,840,090	931,349,959	2,157,561	291,521,873	97,997,651	1,222,871,832
1924	75,562,592	929,257,432	3,439,067	433,072,811	87,038,119	1,482,961,538
1925	97,447,042	1,072,895,796	5,369,796	635,369,920	102,816,833	1,708,265,711
1926	101,179,924	1,031,628,983	9,190,675	569,345,961	110,370,599	1,600,974,944
1927	110,849,208	1,234,064,137	3,898,903	529,559,227	114,748,111	1,763,623,364
1928	118,775,687	1,357,401,642	4,195,720	591,713,199	122,971,407	1,949,114,841
1929	135,050,350	1,193,951,676	4,768,516	700,573,265	139,818,876	1,894,524,941

Sources: Annual reports of the Chief of Engineers, U. S. Army.

A well defined plan of coordination between our waterway and railway transportation systems is essential if the forwarders of package freight are to enjoy the benefits anticipated by the promoters of our inland waterway projects. While it is generally conceded at the present time that the canals should be considered as auxiliaries to the railways and not competitors for freight traffic, there are various reasons why the canals have not received a larger share of the transportation business. That a situation unfavorable to water transportation has existed is due to some extent to the fact that canal and river improvements have represented a large number of separate undertakings, each constructed to suit local conditions with little consideration to the needs of through traffic. There has often been no attempt on the part of the various units to cooperate with one another. While the railways were busily engaged in forming amalgamations or working agreements, thus providing the facilities for the interchange of traffic and the quotation of through rates, those reaponsible for the operation of canal and river transportation have often maintained an attitude of helplessness or indifference.

Every new country passes through four stages of transportation: Transportation by water, by paths and

roads, by rail, and finally the stage of coordination and cooperation - the stage through which we are now passing.

Each of these stages follows naturally, each performs its function satisfactorily considering the conditions involved, each in the order named inevitably leads to the other.*

Plans for the coordination of rail and water traffic have not met with unanimous favor. During the last decade there has been evidence of open hostility on the part of many railway executives. The Association of Railway Executives have made a declaration of policy "that the Government of the United States should discontinue competing with railroads or any other form of transportation either directly or by subsidy".**

Instances have been cited to show that in some cases water transportation has tended to increase the the traffic of competing railways. Mr. James O'Connor in an address before the House of Representatives states the following:

"Recent reports indicate that while the general increase in the average railroad tonnage for 1926 was only 2.6 per cent, those railroads most strongly and naturally in competition with the Mississippi Warrior service of the Inland Waterway Corporation, namely the Illinois Central, Missouri Pacific, Mobile & Ohio, the

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* Annual Report ,Inland Waterway Corp., 1930, p. 19.

** Ibid., p. 14.

Cotton Belt, and the Frisco, increases their tonnage 6 per cent during the same year. It would seem that our governmental waterways agency has helped rather than hurt these railroads".*

Other reports show that for what the waterways have taken away from the railroads, it has returned to the railroads many times through the creation of demands for supplies and distribution that could not be handled by the waterways alone.**

Among the important factors which influence the transportation of package freight on our inland waterways is the question of the establishment of rail-barge and rail-barge-rail rates. This is a question that has been much discussed but little was accomplished before the last decade.

The Interstate Commerce Act defines the jurisdiction of the Interstate Commerce Commission as follows:

"When property may be or is transported from point to point in the United States by rail and water through the Panama Canal or otherwise, the transportation being by a common carrier or carriers, and not entirely within the limits of a single state, the Interstate Commerce Commission shall have jurisdiction of such transportation and of the carriers both by rail and by water, which may or do engage in the same,

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* Cong. Record, Apr. 22, 1929, vol. 71 No. 7, p. 318.

** Annual Report, Inland Waterway Corp., 1930, p. 19.

in the following particulars, in addition to the jurisdiction given by the Act to regulate commerce June 18, 1910:

(a) To establish physical connection between the lines of the carrier and the dock at which interchange of passengers or property is to be made by directing the rail carrier to make suitable connection between its line and a track or tracks which have been constructed from the dock to the limits of the railroad right of way, or by directing either or both of the rail and water carrier, individually or in connection with one another, to construct and connect with the lines of the rail carrier a track or tracks to the docks. The Commission shall have full authority to determine and prescribe the terms and the conditions upon which these connecting tracks shall be operated, and it may either in the construction or the operation of such tracks determine what sum shall be paid to or by either carrier: PROVIDED, that construction required by the commission under the provision of this paragraph shall be subject to the same restrictions as to findings of public convenience and necessity and other matters as is construction required under section 1 of this Act.

(b) To establish through routes and maximum joint rates between and over such rail and water lines, and to determine all the term and conditions under which

such lines shall be operated in the handling of the traffic embraced.

(c) To establish proportional rates, or maximum and minimum proportional rates, by rail to and from the ports to which the traffic is brought, or from which it is taken by the water carrier, and to determine to what traffic and in connection with what vessels and upon what terms and conditions such rates shall apply. By proportional rates are meant those which differ from the corresponding local rates to and from the port and which apply only to traffic which has been brought to the port or is carried from the port by a common carrier by water".*

One of the contentions of the railways has been that the commission did not have power to order the establishment of additional through routes where existing routes are capable of handling the traffic. This contention was answered by the Commission in the opinion which follows:

"Prior to 1910 our power to establish through routes was limited to instances in which no satisfactory through route existed. The elimination of this limitation places within the discretion of this commission the establishment of additional through routes. In the exercise of this discretion the existence of through routes capable of adequately and expeditiously

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* Interstate Commerce Act, Section 6, Paragraph 13.

handling all traffic offered is entitled to much consideration, but no longer constitutes a barrier to another through route".*

The Inland Waterway Corporation Act as amended in 1928 definitely instructs the Interstate Commerce Commission to establish minimum differentials between all rail rate and joint rates in connection with carriers which shall apply under the provision of the Act as follows:

"Any person, firm or corporation, including the Inland Waterway Corporation, engaged or about to engage in conducting a common-carrier service upon the Warrior River or the Mississippi River, or any tributaries thereof, may apply to the Interstate Commerce Commission and obtain a certificate of public convenience and necessity in accordance with the provisions of sec. 1 of the Interstate Commerce Act as amended and the Interstate Commerce Commission shall thereupon, by order, direct all connecting common carriers and their connections to join with such water carrier in through routes and joint rates with reasonable rules, regulations, and practices, as provided in paragraph (3) of section 15 of the Interstate Commerce Act as amended and the Commission shall, in such order, fix reasonable minimum differentials between all rail rates and joint rates in connection with said water service to apply until changed by the Commission".**

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* Flour City S.S. Co. v L.V.R.R. Co. 24 I.C.C., 179

** Inland Waterway Corp. Act, Sec.3 Paragraph (e).

In a discussion of the regulatory policies which govern railroads and waterways, Mr. S. T. Bledsoe, Chairman, Executive Committee, and General Counsel, Atchison, Topeka and Santa Fe Railway made a statement regarding rates as follows:

"Joint rail and water rates are fixed by the Interstate Commerce Commission, usually at 80 per cent of the all-rail rate, although distances from point of origin to destination will average about 50 per cent greater by water than by rail".*

The problem of joint rates and the establishment of physical connection between rail and water carriers is constantly before the Interstate Commerce Commission. Package freight is generally of a more or less perishable nature so that it is absolutely essential that terminals be erected at points of transfer which will adequately protect it from the elements. It is equally essential that facilities for the economical handling of general merchandise be provided because handling charges constitute a large percentage of the cost of transportation.

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* Railroad Data, Vol. XI, No. 4, p.7. Committe on Public Relations of the Eastern Railroads, New York.

A well rounded program for the promotion of waterway traffic must include efficient facilities for the handling of goods in transit and at terminals. Private capital is constantly adding to our floating equipment and terminals are being modernized by both private and public funds. Warehouses and transit sheds are indispensable at water terminals where a considerable volume of package freight is moved. The greater the irregularity of water transportation, the more provision is necessary for the holding and storage of freight. This is particularly true with regard to package freight which is usually of a more or less perishable nature and must be protected from the elements.

Statutory control of carriage over inland waterways in the United States is exercised through a series of acts and administered by a variety of agencies. The federal service upon the Mississippi and Warrior rivers is under the control of the Secretary of War. This is an instance of government operation of inland waterway facilities, administered since 1924 through the Inland Waterway Corporation.

A number of executive departments or bureaus of the Federal Government possess limited authority over inland waterways. These agencies include the Department of Commerce, the Bureau of Navigation, the Steamboat

Inspection Service, the Bureau of Public Health, and the Corps of Engineers of the United States Army, acting under the direction of the Chief of Engineers and the Secretary of War.

The policy of improving the rivers and harbors of the United States under Federal direction and with Federal funds was inaugurated by Congress about 1824. The work has been practically continuous since that time and has been executed principally under the direction of the Corps of Engineers, United States Army.

The present program outlined by the Federal Government contemplates the improvement of the more important rivers and harbors of the continental United States and the more important harbors of Porto Rico, Alaska, and the Hawauan Islands.

During the fiscal year ending June 30,1929, 930 separate authorized projects were in force. The total amount expended by the Federal Government on the works for the fiscal year ending June 30, 1929 was $82,945,862.19. The total expenditure for the work during the year ending June 30, 1930 was $100,746,269.84.*

These figures do not include expenditures by states and municipalities in the exection of terminals. Regarding municipally owned terminals a recent report states:

"All terminals to-day are built by the cities interested, at their own expense, and always motor-water

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* Annual Report, Chief of Engineers, U.S. Army, 1930.

interchange is borne in mind equally with rail-water interchange.

"It is most gratifying to report that with one single exception, each city which has been urged to build a terminal has done so; and in many cases keen rivalry among neighboring cities has been created by a mutual desire to have the terminal located in their city.*

The Congress of the United States in the Rivers and Harbors Act of 1919 announced the following as its policy concerning public terminals at all seaports and river stations:

"It is hereby declared to be the policy of Congress that water terminals are essential at all cities and towns located upon harbors or navigable waterways, and that at least one public terminal should exist, constructed, owned, and regulated by the municipality or other public agency of the State, and open to the use of all on equal terms and with the view of carrying out this policy to the fullest possible extent, the Secretary of War is hereby vested with the discretion to withhold, unless the public interests would seriously suffer by delay, money appropriated in this act for new projects, if in his opinion, no water terminals exist adequate for the traffic and open to all on equal terms, or unless satisfactory assurances are received

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* Annual Report, Inland Waterway Corp., 1930.

that local or other interests will provide such adequate terminal or terminals".*

In order that package freight may move by water in a manner acceptable to the needs of shippers, it is essential that private companies become active in this field of transportation. The Government has helped to prepare the way for the investment of private capital in barge lines by making public facts with regard to the cost of operating towboats and barges and the furnishing of information essential for the running of private lines.

In a report dated January 1, 1930, the Transportation Division of the Bureau of Foreign and Domestic Commerce persents the results of a thorough research conducted relative to the transportation companies operating on the various inland waterways of the United States and the floating equipment owned and operated by them.

This is the first directory of its kind prepared by this bureau. The data were obtained by questionaires sent to the companies operating on the various inland waterways and from reports of the Bureau of Navigation of the Department of Commerce. The United States Army Engineers, War Department cooperated in the work and assistance was given by chambers of commmerce in certain cities.

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* Cong. Record, Dec. 12, 1929, vol. 72 no. 10, p. 590.

The report comprehends all inland waterways in the United States such as rivers, canals, bays, and lakes, exclusive of the Great Lakes. The operations and equipment of 485 individuals, firms, lines, companies, and corporations are covered. These componies own approximately 4,500 barges and 1,300 units of propelling equipment having a total value of about $150,000,000.

Each company is designated as being a common carrier, a contract carrier, or a private carrier. The term common carrier refers to those inland waterway transportation companies offering their services to the public for the transportation of freight or passengers, and usually publishing a freight-rate tariff. Contract carrier refers to those companies which do business on a purely contract basis, and which do not publish freight-rate tariffs. Private carrier refers to those companies which operate transportation lines principally for the purpose of transporting commodities in connection with their own business.

Of the various companies operating on the waterways, 187 companies designated themselves as private carriers, 98 as contract carriers, and 200 as common carriers.

Approximately one hundred sixty of the common carriers transported package freight on regular routes. About ninty of these carriers made daily trips according to schedule and of these forty had rail connection.

Of the remaining common carriers who engaged extensively in package freight traffic on regular routes, sixteen lines made biweekly trips and four of these lines had rail connection. Twenty lines traveled triweekly and six of these had rail connection. Twenty five companies ran on a weekly schedule, seven having rail connection. Over twenty lines did not travel on a regular schedule and only four of these had rail connection.*

On the Mississippi and its tributaries, there were approximately seventy five private carriers, forty common carriers, and thirty contract carriers. Most of the common carriers moved a considerable amount of package freight. The cargoes of the private and contract carriers consisted mostly of bulk freight. Since this report was made a number of large companies have entered the Mississippi service as common carriers with modern floating equipment. The Government has had a large fleet on the Mississippi under the management of the Inland Waterway Corporation. This service will be discontinued as soon as private lines are a able the meet traffic demands.

Many of the modern barges are constructed so as to give ample protection to package freight of a highly perishable nature. Refrigeration service is being offered on many of the lines. Propelling equipment of a modern type is being brought into the service.

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* Inland Waterway Freight Transportation Lines. Domestic Commerce Series, no. 32.

There are a number of lines on the Mississippi system which are listed as being both a common and a private carrier. The distructiveness of competition in the common carrier field by corporations transporting their own products is clearly stated in an address delivered before the Fourth National Conference of Merchant Marines as follows:

"In order that shipping may be free to develop without unfair competition, legislation is called for that will prohibit the operation by industries of ships engaged in common carrier service. In my opinion, no independent operator of ships has any moral right to complain of an industry transporting its own products, but it has a just cause of complaint when that industrial carrier uses the same ship in common carrier service. No independent ship may long compete successfully with an industrially owned ship when that industry controls the routing of a large tonnage that it may confine to its own ships.

"To have independent operation there must be actual competition for all the traffic that is to move in the common carrier service".*

Efficient facilities for the handling of package freight at terminals is equally as important as channels and floating equipment. Mr. James J. Hill once said in connection with railroads that,"the volume of traffic a line could carry could not exceed the capac-

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* Mr. F. Lyon, Report of the Fourth National Conference of Merchant Marines, 1931, p. 172.

ity of the terminals". This statement applies with equal force to water routes.

Waterway transportation has already reached a high state of efficiency. It is becoming evident that one of the principal ways of achieving further economies in water traffic in the near future is the reduction of terminal expenses. Until recently the facilities for handling general merchandise or package freight have been almost entirely lacking on the Mississippi system. The hand truck method has prevailed in many places.*

A standard of efficiency and cost reduction in handling must be worked out for each individual commodity and not for traffic movement in general. A rise in total cost of freight handling may be due to a change in the class of merchandise moving in commercial channels. This was pointed out in an address by Mr. Joseph P. Ryan, President of the International Longshoremen's Association.

"The cost of handling general cargo as a whole is governed largely by the nature or class of cargo. It is possible that while our efficiency in cargo handling is generally improving, the final figures may show that costs per ton are not proportionately reducing. If this be followed up, there is no question but that the figures will show this is largely or entirely due to the higher class of cargo being carried from

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* Annual Report, Inland Waterway Corp., 1926, p. 14.

year to year.

"While the cost of handling this great variety of cargo is considerably more per ton than many cheaper commodities, at the same time the freight revenue earned by the ship is much greater."[*]

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[*] Report of the Third National Conference of Merchant Marines, 1930, p. 132.

Recent developments of inland waterway traffic are marked by the increasing variety of goods which are being transported by water carriers. This is not only true with regard to traffic on the Mississippi System but also other of our more important channels, such as the New York State Barge Canal.

In discussing the variety of goods which now find their way to the Barge Canal, the New York Port Authority makes the following statement:

"A most encouraging sign is the increasing number of new commodities that are being shipped via the Barge Canal, not merely between this city and Buffalo, but from Boston, Philadelphia, Camden and other Atlantic ports to Cleveland, Detroit, Chicago Milwaukee, and Duluth. It seems as though traffic managers havé at last awakened to the importance of water toutes as an economical method of transporting freight.

"A Wisconsin supply house ventured a test shipment of plumbing fixtures early this season, routing twenty carloads to New York City from its Wisconsin plant via the Great Lakes and Barge Canal. The motorship carrying the shipment made excellent time and delivery was made at their Long Island City warehouse in seven days and six hours."*

* New York Times, Sept. 13, 1931. p 12

Greater confidence that the inland waterways are destined to play an increasingly important part in freight traffic has been instrumental in attracting private capital in the development of an extensive inland waterway transportation system. This is a step toward which the government has been working since it first made available a comprehensive freight service on the Mississippi River in 1924.

The Government, through the Inland Waterway Corporation, has endeavored to establish conditions favorable to the operation of privately owned barge lines. In a report of this corporation the situation is stated as follows:

"The more successful private operations can be made, the greater success the government agency will have attained because it was primarily instituted to discover what had destroyed interior water transportation, to correct those evils, and to prove to capital that interior water transportation could be successfully revived".*

During the latter part of 1930, the Mississippi Valley Barge Line Company, a privately owned common carrier, applied for and obtained a certificate of convenience and necessity to operate upon the Ohio River from Cincinnati to Cairo, and on the Mississippi from Cairo to New Orleans. This is the first pri-

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* Annual report of the Inland Waterway Corporation for the year 1930. p.12.

vately owned barge express service on the Mississippi and Ohio Rivers. In 1931 the company began transporting general merchandise from Cincinnati to New Orleans. These two cities are served directly by the new barge line, although many other cities in the Mississippi and Ohio Valleys may profit through joint rail and water rates.

Through an order issued by the Interstate Commerce Commission on July 11, 1931, railroads were directed to establish through rail-barge and rail-barge-rail rates on various commodities between points in the Central territory and points in Southern and Southwestern territory in connection with the Mississippi Valley Barge Line Company.*

The Company's equipment valued at three and one-half million dollars, including a new $500,000 terminal in Cincinnati, consists of six 2,000 hp. towboats and fifty 300 ton barges. The express service is comprised of a towboat and ten to twelve barges.

Through the utilization of this system of river transportation, shippers will effect a saving of from 10 to 25 per cent under all-rail rates, depending on the type of service rendered.*

Six days are required for the downstream trip and twelve days for the upstream haul. Regular weekly service is in effect from Cincinnati to New Orleans.

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* New York Times, August 23, 1931. p. 28.

Within the past year another large transportation company has been organized for operations on the Mississippi System. The service is described in a recent publication as follows:

"Weekly barge service from Pittsburgh to the Southwest is being conducted by the American Barge Company. This company has erected a warehouse and terminal at Louisville and through rates are now in effect via the barge line to Memphis and thence to Oklahoma, Arkansas, Louisiana, and Texas. The company operates 9 towboats and 63 barges with terminals at Glassport, Pa., Louisville, and Memphis and has side-track railroad connections.*

Within the last two years many millions of private capital has been invested in transportation equipment and terminals on the Mississippi Waterway System. This would seem to indicate that there is renewed confidence in the future of this method of transportation. In a recent address before the New England Railroad Club, Thomas Nelson Perkins, Chairman, Boston and Maine Railroad, stated,"more sure than another, it is that in the long run transportation is going to be done by that agency which does it best, and does it best from the point of view of the community".**

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* Business Week, New York. April 22, 1931. p. 20

** Railroad Data. Fron the Committee no Public Relations of the Eastern Railroads, 143 Liberty St. New York. vol. X, no.49, p.99.

The total tonnage of both package and bulk freight carried on the Mississippi Waterway System in 1929 was practically double the tonnage in 1922. Compared with railway traffic for the same period, this is a remarkable increase. Freight traffic on Class I railways in the United States amounted to 339,285,347,571 ton-miles in 1922 and increased to 447,321,561,129 in 1929. In 1930 railway traffic decreased to 383,449,443,010 ton-miles. The present year is bound to show a still further reduction. The volume of freight handled by Class I railways of this country in the first nine months of 1931 anounted to 261,819,675,000 ton-miles.* This was a reduction of 18.6 per cent under the corresponding period in 1930 or 29.2 per cent under 1929.**

Complete data for waterway traffic for 1930 are not yet available. However, there are indications that some channels will show a increase in traffic while on others the reduction will be only slightly below the volume for the previous year. Certain improvements on the Mississippi Waterway System, such as the completion of the nine foot channel of the Ohio from the mouth of the river to Pittsburgh and the operation of through barge service, have been instrumental in attracting commerce and may in some measure be responsible for the slight percentage of loss in traffic compared with that of the railway systems.

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* Bureau of Railway Economics. Washington, D.C.
** Railway Data. vol. X, no. 49, p.99. New York.

The railways also have made many improvements during the last decade. Gross expenditures for additions and betterments to railway property by Class I railways, excluding switching and terminal companies, amounted to $853,721,000 in 1929 and $872,608,000 in 1930. Of the $872,608,000 expended in 1930, $328,269,000 was invested in equipment and $544,339,000 was used for roadways and structures. Thus the property investment of the railways has increased about 25 per cent in the last ten years. The investment in road and equipment of Class I railways in the United States in 1921 was $20,338,443,697 and in 1930 this item amounted to $25,664,656,010. The rate of return on total property investment in 1926 was 4.96 per cent, which was the highest rate for any year during this period. In 1930 the rate of return on investment of Class I railways in the United States had decreased to 3.27 per cent and there are indications that the rate for the present year will be below three per cent.*

The issue between the promoters waterways and railways is now being fanned to a white heat. This conflict must cease if both systems of transportation are to perform their respective functions adequately.

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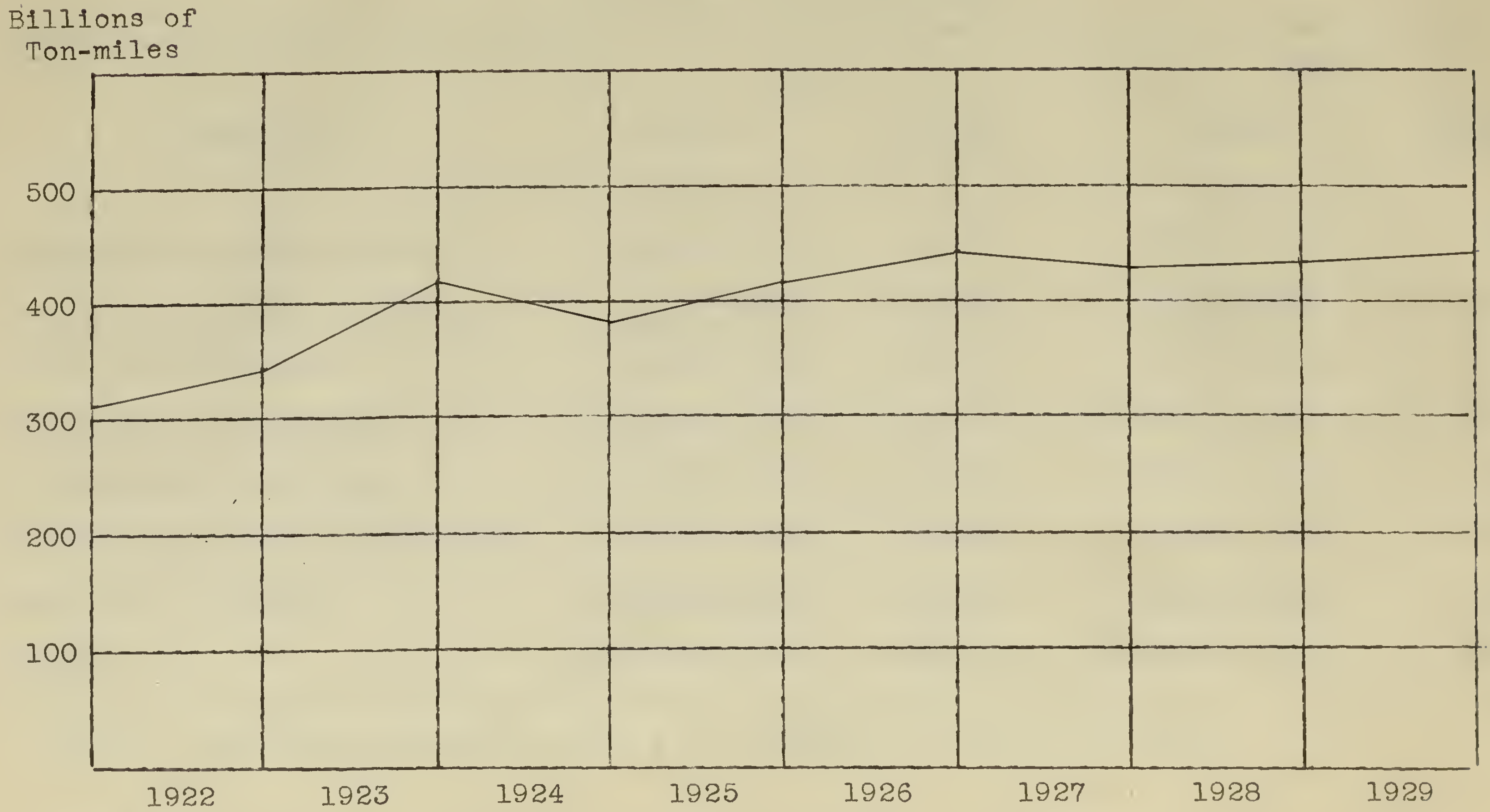
* Statistical Exhibits Filed on Behalf of the Carriers before the Interstate Commerce Commission, Ex Parte 103. Bureau of Railway Economics, Washington, D. C.

REVENUE FREIGHT CARRIED BY CLASS I RAILWAYS, 1922 to 1929.

UNITED STATES



Source of basic data: Bureau of Railway Economics. Washington, D. C.

TOTAL TONNAGE CARRIED BY COMMODITY GROUPS, CLASS I STEAM RAILWAYS
United States, 1928-1929.

Commodities	1928 Amount Tons	1928 Percent of total	1929 Amount Tons	1929 Percent of total
Products of Agriculture	225,550,147	9.55	223,263,595	9.11
Animal and Animal Products	45,723,698	1.94	44,728,689	1.82
Total Farm Products	271,273,845	11.49	267,992,281	10.92
Products of the Mines	1,234,485,378	52.27	1,296,810,803	52.90
Products of the Forest	187,347,241	7.93	182,177,204	7.43
Manufactures and Miscellaneous	605,255,923	25.63	642,191,195	26.19
All l.c.l. Freight	63,260,249	2.68	62,429,601	2.55
Total	2,361,622,633	100.00	2,451,601,084	100.00

Source: Annual Reports on Statistics of Railways in the United States.

REVENUE FREIGHT CARRIED BY COMMODITY GROUPS, CLASS I STEAM RAILWAYS
United States, 1922-1927.

Commodities	Per cent of total tons					
	1922	1923	1924	1925	1926	1927
Products of Agriculture	11.99	9.45	10.63	9.33	9.08	9.36
Animals and Animal Products	2.44	2.09	2.23	2.01	1.91	1.98
Products of the Mines	49.56	53.58	51.33	52.60	54.42	53.84
Products of the Forest	9.30	9.54	9.64	9.12	8.30	8.16
Manufactures and Miscellaneous	22.91	22.19	23.04	23.98	23.52	23.88
All l.c.l. Freight	3.80	3.15	3.13	2.96	2.77	2.78
Total	100.00	100.00	100.00	100.00	100.00	100.00

Source: Annual Reports on Statistics of Railways in the United States.

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